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(54) Dust collecting attachment for power drills

(57) A dust and particle collecting attachment for power drills that is releasably secured to the drill and the inlet aperture (1) positioned under the drilling site so as to collect the waste material. A returnable sliding or deformable section (4) allows the drill to penetrate the material being drilled and ensures the position of the inlet aperture is maintained when the drill is withdrawn. Embodiments are also described where suction is applied, wherein the air flow is generated within the attachment, by the power drill or via a domestic/industrial vacuum cleaner.

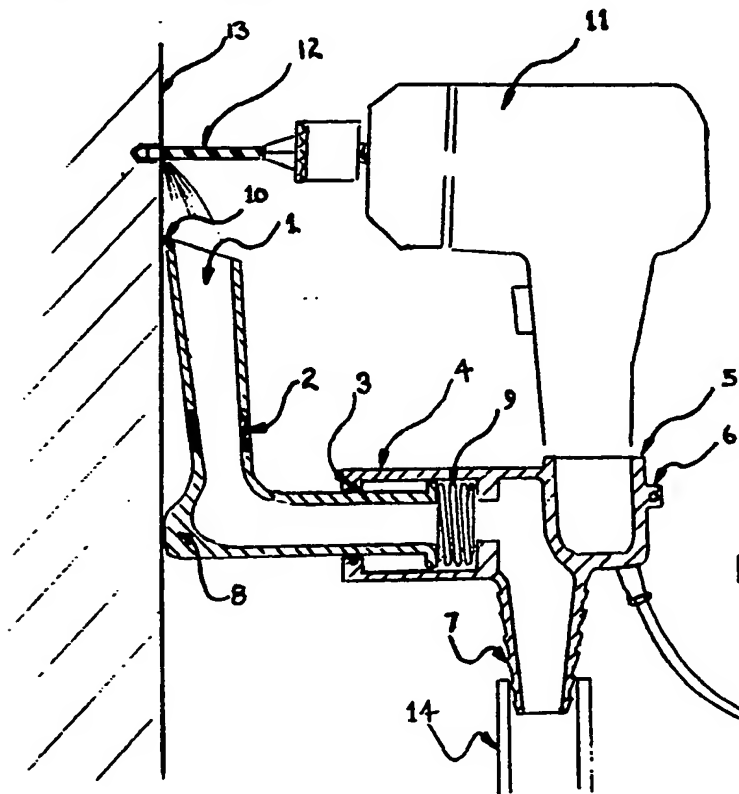


Figure 4

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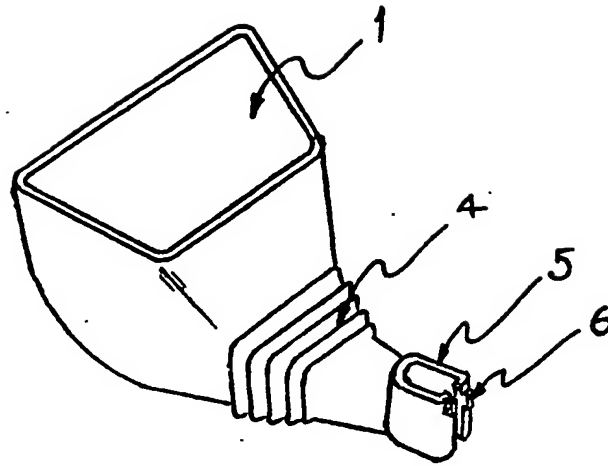


FIGURE 1

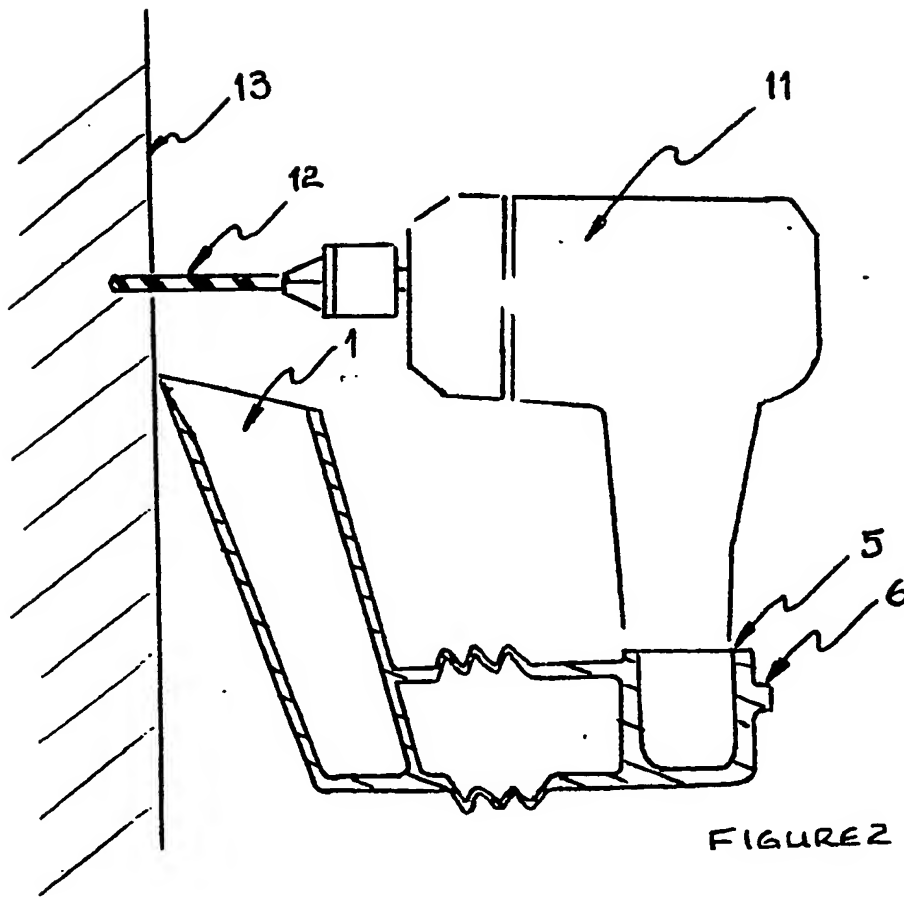


FIGURE 2

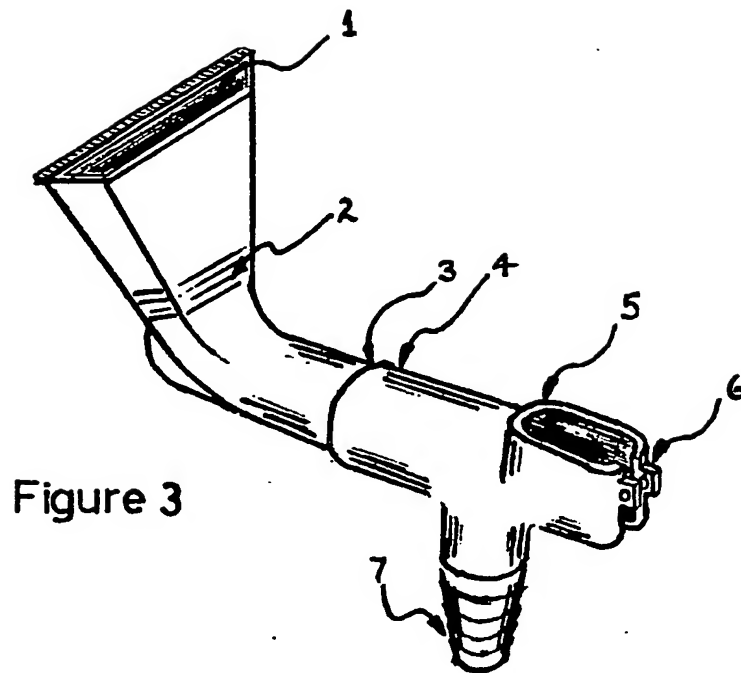


Figure 3

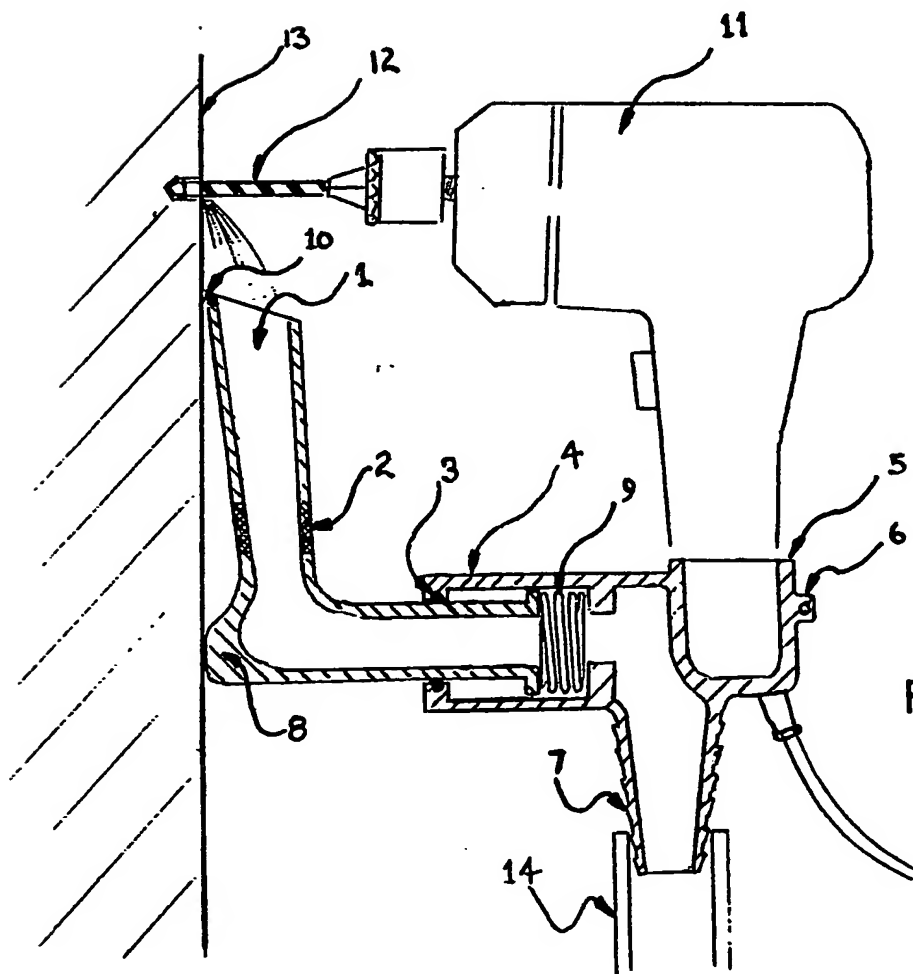


Figure 4

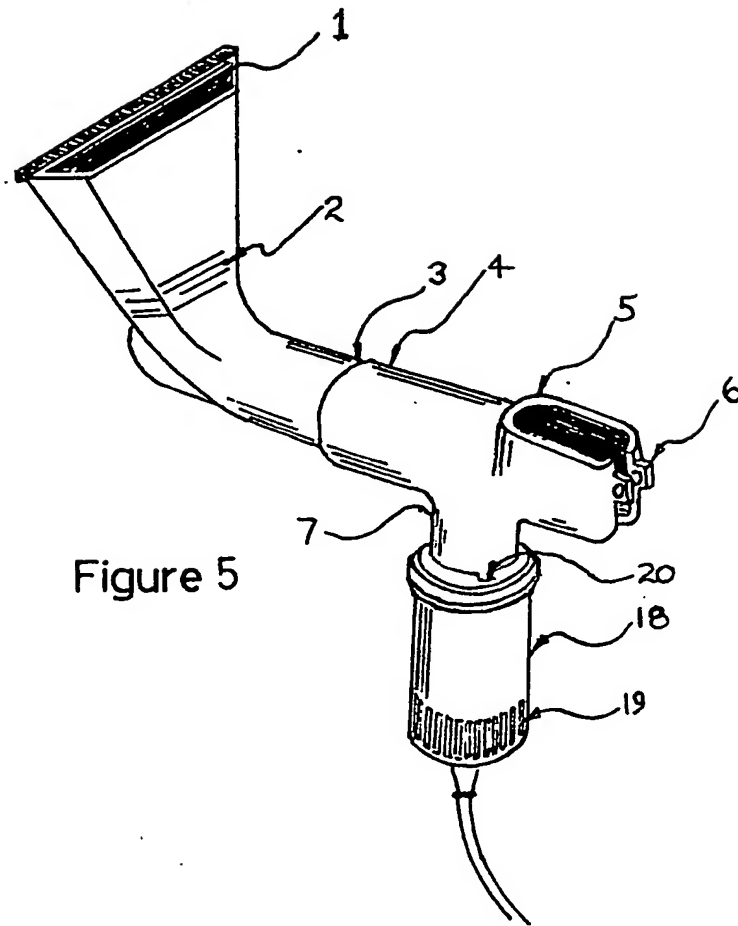
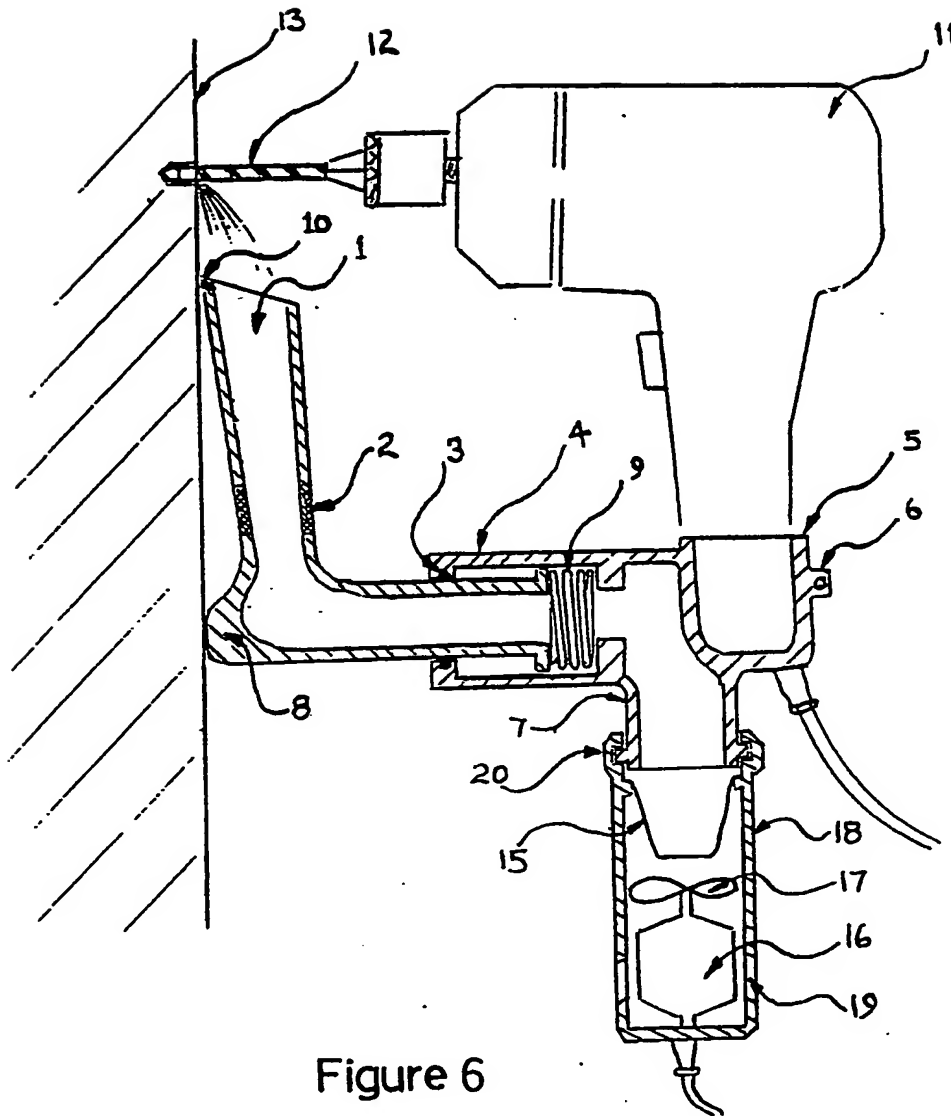
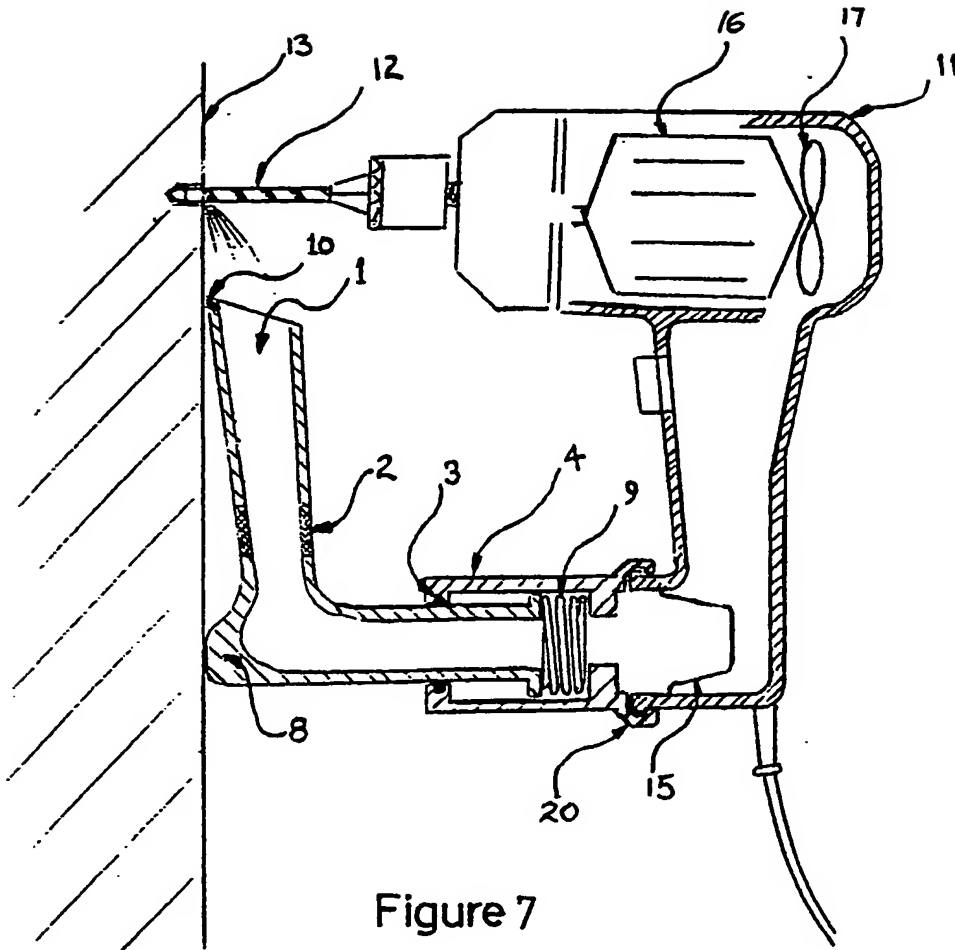


Figure 5





DUST COLLECTING ATTACHMENT FOR POWER DRILLS

The present invention relates to an attachment for an electric or other power drills. The invention collects waste material during the drilling process by the action of gravity or the combined action of gravity and air flow or air flow alone.

It is well known that drilling holes in materials which include wood and masonry materials like brick and breeze blocks generates a quantity of dust and particulate matter. This debris generally falls and deposits itself over the surrounding area where drilling has taken place. In certain circumstances this dust and particles are difficult to subsequently remove from the surfaces on which they have been deposited or from equipment which they have fallen into.

The problem then is to collect the waste dust and particulate material as it is generated at or close to the drilling site before it falls to the surrounding surfaces. The problem is solved according to the present invention by the following features. According to the present invention there is provided an attachment for collecting by the action of gravity, or the combined action of gravity and air flow, or air flow alone the dust and particles as they are generated by the drilling process.

The invention comprises an inlet aperture being adapted for the efficient collection of waste material, an adjustable section of ducting to allow positioning of the inlet aperture and also allow for movement as the drill penetrates the material being drilled, a mechanism for maintaining the inlet aperture against the surface being drilled when the drill bit is being withdrawn, a clamping assembly adapted to allow fixing to power drills, a means to trap/collect the dust and particulate matter.

A specific embodiment of the invention is shown in figures 1 and 2. Figure 1 is a general perspective view of the invention. Figure 2 is a cross section through the invention and shows how it connects to a power drill. The invention comprises a body incorporating an open ended suitably shaped container with an inlet aperture 1. The container being connected to an adaptor/clamping assembly 5 and 6 by a flexible or deformable or telescopic section 4. The flexible, deformable or telescopic section being configured so that it compresses when the drill bit is entering the material being drilled 13 and extends to keep the edge of the inlet aperture 1 against the material as the drill bit is being withdrawn. This may be accomplished by incorporating a spring in the flexible or deformable or telescopic section. There are any number of other mechanisms to achieve this. A brush 10 well known in vacuum cleaner technology may be incorporated at the edge of the inlet aperture to accommodate variation in the surface being drilled, alternatively, that edge of the inlet aperture should be formed from thin flexible section with a tapered edge to accommodate variations in the surface being drilled. The adaptor/clamp section can be designed to suit the handle of a power drill for fixing, but other locations may be used for locating the invention. A slot may be included for the drill's power lead to protrude.

The adaptor 5 comprises a clamping mechanism 6 which may be two protrusions one with a threaded hole the other with a clearance hole. A thumb screw may then be used to pull the protrusions together and clamp the invention to the handle of the drill 11. There are any number of other clamping methods which may be used.

In use the inlet aperture of the invention is located below the drilling site and collects the particles generated by the action of gravity causing them to fall into the inlet aperture.

A second embodiment of the invention is shown in figures 3 and 4. Figure 3 is a general perspective view of the invention. Figure 4 is a cross section through the invention which shows the invention's internal components and how it connects to a power drill. The invention comprises as previously a body incorporating an open ended suitably shaped container with an inlet aperture 1 with an edge to press up against the surface to be drilled. The container being connected to the adaptor/clamping assembly 5 & 6 by a flexible ducting 2 and telescopic or compressible section 4 that allows positioning of the inlet aperture. In this embodiment the flexible ducting 2 may or may not be included. A seal 3 may be incorporated to prevent air leakage and dust escape from the telescopic or compressible section. The telescopic or compressible section will slide as the drill bit 12 enters the material being drilled 13. A protrusion 8 is included to ensure that contact with the wall results in the force acting along the axis of the telescopic or compressible section. A return mechanism 9, for example a spring, is also included to keep the inlet aperture against the material when the drill bit is being withdrawn, any number of other returnable deformable mechanisms, eg bellows, may be used. A brush 10 well known in vacuum cleaner technology may be incorporated at the edge of the inlet aperture to accommodate variations in the surface being drilled. Alternatively the edge may be a thin tapered section to accommodate surface variations.

The adaptor/clamp section may be designed to suit the handle of a power drill. This is a convenient position on the drill for fixing, but other location may also be used for locating the invention. A slot may be included for the drill's power lead to protrude. The adaptor 5 comprises a clamping mechanism 6 which may be two protrusions one with a threaded hole the other with a clearance hole. A thumb screw may then be used to pull the protrusions together and clamp the invention to the handle of the drill 11. There are any number of other clamping methods which may be used.

Adjacent to the adaptor region is a connection 7 being adapted to be suitable for connection to an external vacuum generator or device for creating airflow, for example, for connection to a domestic or industrial vacuum cleaner via the vacuum cleaner's tube 14. The adaptor 7 shown comprises a tapered tube with flexible (rubber) barbs which provide a seal and retention facility when pushed into the vacuum tube.

A vacuum generator or air flow device is connected to the connector 7 in such a way that air is drawn in through the inlet aperture via the connecting tube and into the vacuum generator's particle trap (filter). Then in use the inlet aperture is located below the drilling site and collects the generated particles by the combined action of gravity and airflow into the inlet aperture.

A third embodiment of the invention is shown in figures 5 and 6. As previously, the invention comprises a body incorporating an open ended suitably shaped container with an inlet aperture 1. The container being connected to an adaptor/clamping assembly by a semi-flexible ducting 2, a telescopic or compressible section 4, a return mechanism 9, a clamp section 5, an outlet region 7 and motor housing 18, arranged to form a complete assembly. Included in the motor housing is a filter 15, motor 16, fan 17 and vents 19. The housing 18 is removable to allow access to the filter 15 for replacement or cleaning. A bayonet type connection 20 is shown to hold the motor housing to the main assembly but any number of other arrangements could be used. When power is applied to the motor 16 the fan 17 rotates in such a direction so as to draw air in through the inlet aperture 1 via the telescopic or compressible section and through the filter 15 where the particles are trapped. The filter 15 is well known in vacuum cleaner technology. The telescopic section and return mechanism serve to keep the invention against the wall as described previously. The brush 10 is included to accommodate variations in the surface being drilled. The motor is shown powered by its own mains supply lead. However, the invention may be powered by batteries including rechargeable batteries. The invention may also be powered from an electrical connection located in the adaptor section 5, this connection would mate with the appropriate connection located in the power drill.

As previously described, in use the inlet aperture is placed below the drilling site where particles are collected by the inlet aperture by the combined action of gravity and air flow into the inlet aperture. The dust and particles are trapped by the filter 15. Whilst the air passes through with relative ease. The filter 15 is well known in vacuum cleaner technology.

The invention is applicable to any power drill, this includes mains electric, DC electric, battery operated, rechargeable or standard, pneumatic, hydraulic or other power source.

A fourth embodiment of the invention where the invention is fully integrated into the structure of the power drill is shown in figure 7. There are any number of other possibilities of performing this integration. As previously described the invention comprises of a body incorporating a suitably shaped container with an inlet aperture 1, a semi-flexible section 2, telescopic or collapsable section 4, a protrusion 8, a return mechanism 9, a filter or dust trap 15. A bayonet type connection 20 is shown to allow access to the filter 15 for cleaning or replacement, any number of other connection arrangements could be used.

In this embodiment of the invention the cooling fan already included in the power drill is used to draw air into the aperture 1 and through ducting 2 and region 3, through the filter/dust trap 15 which collects the particles. The air then flows through additional ducting either in or adjacent to the power drill handle and then passes over the electric motor for cooling purposes. If a pneumatic power drill or one using another energy source is considered, then the compressed air (or other energy source) is used to draw air in through aperture 1, either by turning a fan or using the compressed air (fluid) to create a partial vacuum region down stream of the filter by the rapid flow of air (fluid) across an aperture.

CLAIMS

1. A dust and particle collecting attachment comprising a body in the form of suitably shaped container being adapted to include an inlet aperture, a returnable sliding or deformable section and a means of releasably securing the attachment to power drills.
2. A dust and particle collecting attachment as claimed in Claim 1 wherein the container is connected via suitable ducting and the sliding/deformable section to an exhaust aperture, a means of releasably securing the exhaust aperture to a supply of vacuum or suction.
3. A dust and particle collecting attachment as claimed in Claim 1 or Claim 2 wherein a protrusion is incorporated so as to ensure the force acting on the sliding or deformable section is in the appropriate direction.
4. A dust and particle collecting attachment as claimed in Claims 1 or Claim 2 or Claim 3 wherein an additional flexible section is incorporated so as to ensure the inlet aperture can be positioned to collect dust and particles with more effect.
5. A dust and particle collecting attachment as claimed in Claim 2 or Claim 3 or Claim 4 wherein a generator of air flow is incorporated into the attachment together with a means of collecting/trapping the dust and particles.
6. A dust and particle collecting attachment as claimed in Claim 2 or Claim 3 or Claim 4 or Claim 5 wherein the device is integrated into the housing of the power drill, the source of air flow being supplied by the power drill.
7. A dust and particle collecting attachment substantially as described herein with reference to figures 1 to 7 of the accompanying drawings.

Amendments to the claims
have been filed as follows

1. A dust and particle collecting attachment for use with power drill tools, comprising a suitably shaped container with an inlet aperture that does not completely surround the drill or drill chuck assembly, a returnable sliding or deformable section and a means of releasably securing the attachment to power tools. The inlet aperture of the container being extended perpendicular to the drill direction and being attached to the power tool in such an orientation that during the drilling process the inlet aperture is positioned below the drilling site so as to collect debris and allow clear visibility of the drilling site. In addition the invention permits free and complete access to the drill chuck for changing or replacing standard drill bits without the need to remove the invention from the power tool.

2. A dust and particle collecting attachment as claimed in claim 1 wherein the container is connected via suitable ducting and the sliding/deformable section to an exhaust aperture, a means of releasably securing the exhaust aperture to a supply of vacuum or suction.

3. A dust and particle collecting attachment as claimed in claim 1 or claim 2 wherein a protrusion is incorporated so as to ensure the force acting on the sliding or deformable section is in the appropriate direction.

4. A dust and particle collecting attachment as claimed in claims 1 or claim 2 or claim 3 wherein an additional flexible section is incorporated so as to ensure the inlet aperture can be positioned to collect dust and particles with more effect.

5. A dust and particle collecting attachment as claimed in claim 2 or claim 3 or claim 4 wherein a generator of air flow is incorporated into the attachment together with a means of collecting/trapping the dust and particles.

6. A dust and particle collecting attachment as claimed in claim 2 or claim 3 or claim 4 or claim 5 wherein the device is integrated into the housing of the power drill, the source of air flow being supplied by the power drill.

7. A dust and particle collecting attachment substantially as described herein with reference to figures 1 to 7 of the accompanying drawings.